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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,665	08/29/2001	Hajime Yamamoto	011096	4795

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ARMSTRONG, WESTERMAN & HATTORI, LLP
1725 K STREET, NW
SUITE 1000
WASHINGTON, DC 20006

EXAMINER

THORNTON, YVETTE C

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 06/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/940,665

Applicant(s)

YAMAMOTO ET AL.

Examiner

Yvette C. Thornton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 8-19, 21, 23 and 25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-7, 20, 22 and 24 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>3</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This is written in reference to application number 09/940665 filed on August 29, 2001.

Information Disclosure Statement

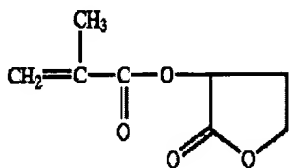
1. The information disclosure statement (IDS) submitted on November 13, 2001 has been entered and fully considered by the examiner.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

3. The disclosure is objected to because of the following informalities: the specification teaches the use of a copolymer of 2-methyladamantyl methacrylate and gamma-butyrolactone methacrylate (spec. pg. 3, l. 11-pg. 4, l. 10). However, the structure presented for gamma-butyrolactone appears to be incorrect. See pg. 3, l. 20-29; pg. 9, l. 17-27; pg. 11, l. 7-17; pg. 14, l. 11-20; and pg. 17, l. 1-10. The correct structure of gamma-butyrolactone methacrylate



should be

4. The disclosure also contains typographical errors such as "metacrylate" on page 14, line 7 of the specification. The examiner suggests checking for entire specification for similar errors.
5. Appropriate correction is required.

Election/Restrictions

6. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-7, 20, 22 and 24, drawn to a resist composition comprising three components, classified in class 430, subclass 270.1.
 - II. Claims 8-19, 21, 23 and 25, drawn to a resist composition comprising two components, classified in class 430, subclass 270.1.
7. The inventions are distinct, each from the other because of the following reasons:
 - a. Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01).

In the instant case the different inventions are two photoresist compositions comprising two different base resins. The first comprising a resin binder, a photoacid generator and a compound which has an acetal moiety and a site which is eliminated by an acid. The second composition comprises a base resin which is a copolymer having the combination of an acetal moiety and a site eliminated by an acid in one repeating unit and a photoacid generator. A search for one binder would not readily reveal binders of the other invention. Furthermore the invention of the first invention requires an additional component, which is not required by the second invention.
 - b. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

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8. During a telephone conversation with Donald Hanson on May 16, 2003 a provisional election was made with traverse to prosecute the invention of group I, claims 1-7, 20, 22 and 24. Affirmation of this election must be made by applicant in replying to this Office action. Claims 8-19, 21, 23 and 25 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

9. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Objections

10. Claims 3-5 are objected to because of the following informalities: Instant claim 3 fails to have a period at the end. Instant claims 4 and 5 contain the typographical error "methcrylate" in line 3 of each claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

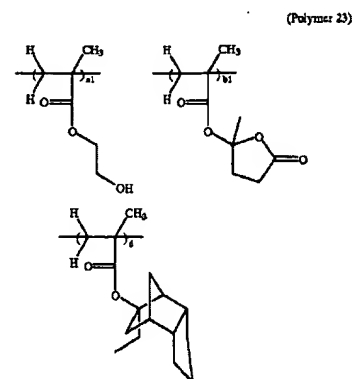
11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

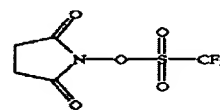
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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12. Claims 1, 2 and 4-5 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Kinsho et al. (US 6,312,867 B1). Kinsho exemplifies in example I-57, a resist

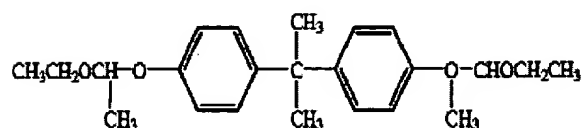


composition comprising (1) polymer 23 having the structure: (a1 = 0.20, a2 = 0.20, a3 = 0.60, Mw = 10,600) (c. 70, l. 28-50);



(2) photoacid generator 8 having the structure: (c. 70, l. 10);

(3) dissolution inhibitor 1 having the structure:



; (4) basic compound tributylamine (TBA); and

(5) solvent PGMEA (table 3, c. 73-74). The said composition was spin-coated onto a silicon wafer, then baked on a hot plate, exposed using ArF excimer laser stepper, baked and developed with a solution of TMAH in water to give a positive pattern (c. 70, l. 60-67). See also examples I-59, I-60, III-29, III-31 and III-32. It is the examiner's position that the exemplified polymer meets the limitation of a copolymer of two or more acrylate or methacrylate monomers as set forth in instant claim 4. The exemplified dissolution inhibitor meets the limitations of a compound having the combination of an acetal moiety (one -OCH3CHOCH2CH3 group) and a site, which is eliminated by an acid (the other

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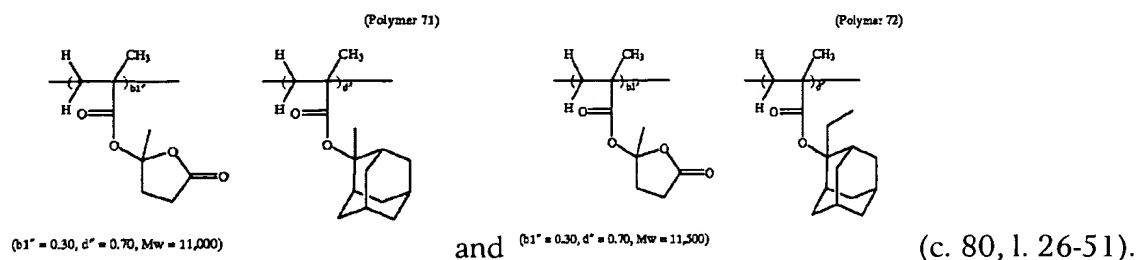
OCH₃CHOCH₂CH₃ group). The said moiety is an ethoxyethoxy group which is readily acid labile. The said dissolution inhibitor is capable of producing a ring structure after reacting in the presence of an acid.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

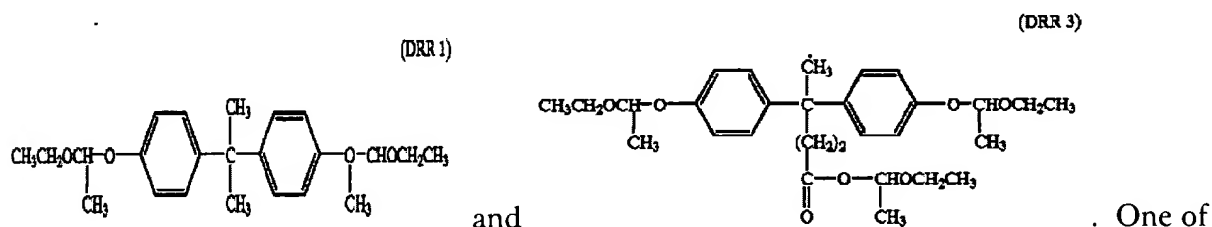
14. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinsho et al. (US 6,312,867 B1) as applied to claims 1-2 and 4-5 above. Kinsho teaches all the limitations of the instant claims except it fails to exemplify the combination of a copolymer of 2-methyladamantyl methacrylate and gamma-butyrolactone methacrylate with a compound having an acetal moiety and a site, which is eliminated by an acid. Kinsho does however in examples I-7 and I-8, exemplify a resist composition comprising polymers 71 and 72. The said polymers have the following structure respectively:



Kinsho clearly teaches that a dissolution inhibitor may be added to the taught photoresist compositions (c. 29, l. 39-c. 32, l. 45). It is the examiner's position that the

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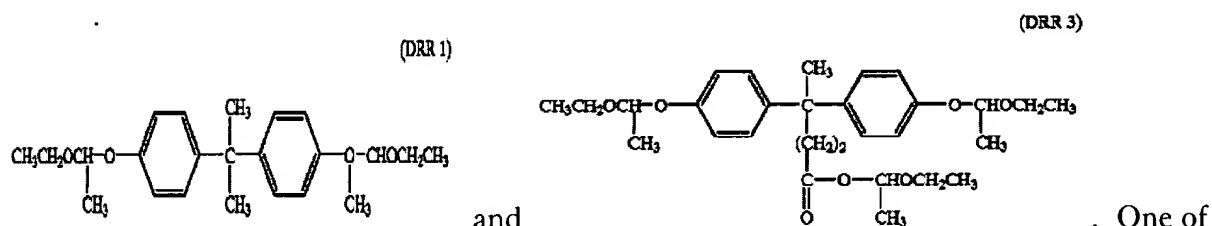
exemplified dissolution inhibitors are the preferred compounds. Specifically, compounds DRR1 and DRR3 meet the limitations of a compound having the combination of an acetal moiety (one $-\text{OCH}_3\text{CHOCH}_2\text{CH}_3$ group) and a site, which is eliminated by an acid (the other $\text{OCH}_3\text{CHOCH}_2\text{CH}_3$ group). The said moiety is an ethoxyethoxy group which is readily acid labile. The said compounds have the following structures respectively:



One of ordinary skill in the art in light of the teachings of Kinsho would have been motivated, as it would have been obvious, to incorporate the exemplified dissolution inhibitors, specifically DRR1 and DRR3 into the exemplified compositions of example I-7 and I-8 in the amount between 5-50 parts by weight in order to improve resolution of the exemplified composition (c. 32, l. 33-40).

15. Claims 1-2, 4-7, 20, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakanishi et al. (US 6,537,726 B2) in view of Kinsho et al. (US 6312867 B1) and Grober et al. (US 6376149 B2). Nakanishi exemplifies in the comparative example a photoresist composition comprising a resin made of 2-methyl-2-adamantyl methacrylate and B-methacryloxyloxy- γ -butyrolactone copolymer (c. 10, l. 7-17); an acid generator, a quencher and a solvent. It is the examiner's position that the comparative example of Kinsho discloses what is well known and conventional in the art.

Kinsho clearly teaches that a dissolution inhibitor may be added to photoresist compositions (c. 29, l. 39-c. 32, l. 45). It is the examiner's position that the exemplified dissolution inhibitors of Kinsho are the preferred compounds. Specifically, compounds DRR1 and DRR3 meet the limitations of a compound having the combination of an acetal moiety (one -OCH₃CHOCH₂CH₃ group) and a site, which is eliminated by an acid (the other --OCH₃CHOCH₂CH₃ group). The said moiety is an ethoxyethoxy group which is readily acid labile. The said compounds have the following structures respectively:



ordinary skill in the would have been motivated by the teachings of Kinsho to incorporate the exemplified dissolution inhibitors, DRR1 or DRR3 into the exemplified compositions of Nakanishi in the amount between 5-50 parts by weight in order to improve resolution (see Kinsho c. 32, l. 33-40). The said dissolution inhibitor is capable of producing a ring structure after reacting in the presence of an acid.

Nakanishi teaches that comparative resist composition is spin-coated on a silicon wafer having an organic reflection preventing membrane thereon. The said composition is dried to form a resist film, which is pre-baked and irradiated with an ArF excimer stepper. The exposed wafer was subjected to post-exposure baking on a hot plate. Then the wafer was developed with TMAH for 60 seconds to obtain a line-and-space pattern of 0.18 μm (c. 10, l. 39-67). Although Nakanishi fails to teach a process wherein the formed pattern is

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transferred to the taught underlying layer, the examiner is of the position that it is well known in the art of semiconductors and microlithography. This position supported by the background teachings of Grober which discloses that microlithography is a commonly practiced process of creating a patterned mask on the surface of a semiconductor wafer so that subsequent patterned processes may be performed. Typically these subsequent processes involve the addition or subtraction of material by deposition, implant doping or plasma etching. Frequently, the pattern is transferred from an exposure mask to the wafer using a photoresist layer and optical lithography exposure tools (c. 1, l. 27-35). It would have been obvious to one of ordinary skill in the art to pattern the underlying layer of Nakanishi by using the formed photoresist pattern as it is well known and conventional in the art of microlithography as supported by Grober.

Allowable Subject Matter

16. Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter: review of the prior art failed to teach and/or suggest a compound having the given structure of instant claim 3.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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- Yagihashi et al. (US 2003/0096189 A1) which teaches onium salts and positive resist materials using the same.
- Uetani et al. (US 6383713 B1) which teach chemical amplification type positive resist compositions.
- Kodama et al. (US 6291130 B1) which teach positive photosensitive compositions.
- Nagata et al. (US 5856561 A) which teach bisphenol carboxylic acid tertiary ester derivatives and resist compositions thereof.

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yvette C. Thornton whose telephone number is 703-305-0589. The examiner can normally be reached on Monday-Thursday 8-6:30.

20. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet C. Baxter can be reached on 703-308-2303. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

21. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1495.


Yvette Clarke Thornton
Junior Examiner
Art Unit 1752

yct
June 12, 2003